

Reference 31

Basche, AD; DeLonge, MS 2017 The Impact of Continuous Living Cover on Soil Hydrologic Properties: A Meta-Analysis SOIL SCI SOC AM J, 81, 5, 1179-1190
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Background and objective

Increased rainfall variability due to climate change threatens the efficacy of critical soil ecosystem services. One strategy to negate effects of too much or not enough rainfall is to improve soil water properties. Practices that offer “continuous living cover” can enhance soil water storage and other soil hydrologic properties relative to annual crop systems, but to what extent such benefits can accrue, under different conditions, remains under-quantified. Provide a quantitative summary of how practices that promote continuous living cover including cover crops, perennial crops, agroforestry and managed forestry, improve two key soil hydrologic properties that relate to water storage.

Search strategy and selection criteria

The EBSCO Discovery Service (<https://www.ebscohost.com/discovery/content>) was the primary search engine used to compile the database for this analysis. The search terms included were: water retention OR field capacity OR moisture retention OR porosity AND perennial W1 grass* OR cover crop* OR agroforest* OR forest*. These keyword terms found >400 studies, of which 25 ultimately fit our criteria. To supplement the EBSCO Discovery Service search, the USDA–NRCS Soil Health Literature Database (USDA–NRCS, 2016) was used to find additional research papers. This database is an ongoing effort of the NRCS Soil Health Division to categorize the impact of conservation practices on soil properties and uses large search databases (including Google Scholar) to find papers. (i) Studies compared land managed with continuous plant growth (including cases of actively restored perennial landscapes) versus annual crop systems that did not include continuous plant cover and (ii) Studies measured at least one of two indicators of soil hydrology: water retained at field capacity (the maximum level of plant available soil water, hereafter referred to as field capacity) or total porosity (the maximum volume of water that soil can hold).

Data and analysis

The EBSCO Discovery Service (<https://www.ebscohost.com/discovery/content>) was the primary search engine used to compile the database for this analysis. It searches a comprehensive collection of titles, including more than 23,000 publications from databases such as JSTOR and publishers such as Wiley, Elsevier, Springer–Nature, IOP, Royal Society, Oxford, Cambridge, Thomson Reuters, AAAS, and the American Society of Agronomy. The EBSCO Discovery Service matches on subject headings, keywords, and abstracts, making it an ideal search engine for building a database targeted to the highly specific question in this analysis. The keyword search included descriptors of the soil properties (given the multiple terms that might be used to describe field capacity) as well as the different continuous living cover practices. The search terms included were: water retention OR field capacity OR moisture retention OR porosity AND perennial W1 grass* OR cover crop* OR agroforest* OR forest*. These keyword terms found >400 studies, of which 25 ultimately fit our criteria. To supplement the EBSCO Discovery Service search, the USDA–NRCS Soil Health Literature Database (USDA–NRCS, 2016) was used to find additional research papers.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
6	Annual crops	Cover crops	No cover crop	Metric: Water retained at field capacity, Soil porosity; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	56.25

Results

- There was evidence of improvements in both hydrologic properties analyzed (however, no statistical analysis is provided).
- NULL
- NULL
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

There was evidence of improvements in both hydrologic properties analyzed (however, no statistical analysis is provided).